IN THE DRAWINGS

The attached Replacement Drawing Sheet includes changes to Fig. 4; a label "Prior Art" has been added per request of the Examiner. This sheet, which includes Figs. 3 and 4, replaces the original sheet including Figs. 3 and 4.

The attached New Drawing Sheet includes Figs. 8A and 8B which indicate two additional reference characters. Reference characters 18 (solder resist ink) and 20 (at least one peripheral component) now show every feature of the invention as specified in the claims.

Attachments: Replacement Sheet (1), New Sheet (1)

REMARKS/ARGUMENTS

Claim Status

Claims 1 and 3-9 are currently pending. Claim 2 is canceled without prejudice. Claim 1 is currently amended to incorporate the subject matter of claim 2. Claims 1 and 3-7 are currently amended to correct antecedent basis and for grammatical purposes. Claim 5 is currently amended to further clarify what is meant by "a flip chip assembly technique" and finds support in the specification: pg 7, lines 5-6. New claims 8 and 9 find support in the specification: pg 6, lines 6-8. No new matter has been entered.

Drawings

Figure 4 is currently amended to include the legend "Prior Art" and a Replacement Drawing Sheet is submitted herewith.

The Examiner has requested that the "solder resist ink" and the "at least one peripheral component" be shown in the drawings or canceled from the claims. The attached New Drawing Sheet which includes Figs. 8A and 8B indicates reference characters 18 (solder resist ink) and 20 (at least one peripheral component). Therefore, the drawings now show every feature of the invention as specified in the claims.

Accordingly, the drawings objections have been obviated.

§112, second paragraph, Rejections

Claim 1 has been amended in numerous locations to correct antecedent basis problems between "the co-fired substrate", "the aluminum nitride substrate" and "the substrate". All instances have been amended to "co-fired aluminum nitride substrate".

Claim 3 has been amended to clarify that the "peripheral component is selected from the group consisting of diodes for inhibiting current, resistances, and thermistors", and finds support in the specification: pg 4, line 26, to pg 5, line 1.

Claim 7 has been amended to correct antecedent basis of "the resist film" to "the white resist film".

Accordingly, all §112 rejections have been obviated in view of the amendments discussed above.

§103(a) Rejections

Claims 1, 2, 4 and 5 are rejected under 35 U.S.C. §103(a) as being unpatentable over *Lee* in view of *Shinosawa*. First, Applicants point out that co-fired substrates and post-fired substrates, and their differences, are well known in the art (See US 6,316,116). A co-fired substrate is a substrate wherein the substrate body, via-holes for electric conduction, and circuit layers are simultaneously formed by one sintering operation (col. 1, lines 57-60). In contrast, the substrate body, via-holes and circuit layers of a post-fired substrate are formed separately by their respective heating operations (col. 3, lines 37-55). Applicants have unexpectedly found that the resulting surface of a co-fired aluminum nitride (AIN) substrate is very smooth and allows for easy control of the surface roughness, which in turn results in reduced manufacturing costs. Whereas, in the case of a post-fired substrate, the resulting surface is coarse due to a glass component inevitably bleeding out at the surface after sintering. Thus, the bled glass component of a post-fired substrate must be removed (e.g., by grinding) which increases manufacturing time and costs.

Lee teaches a semiconductor device comprising a substrate, a mounting pad, a connecting pad, an interconnecting element and a semiconductor die ([0009]). However, *Lee* fails to teach or suggest the substrate being aluminum nitride, nevermind "co-fired" aluminum nitride as required by claim 1, or that the surface roughness is 0.3 μm Ra or less. Furthermore, *Lee* teaches the use of a bonding wire (254) for securing an electrical conduction (See Figure 2A and [0026]-[0032]). In contrast, Applicants' device, due to the claimed arrangement of the via-holes, "eliminates the necessity of connection of

interconnections on the front surface of the substrate by a wire bonding process, simplifies the interconnection structure, avoids the protrusion of bonding wires in a thickness direction of the light emitting apparatus, and the light emitting apparatus can thereby be reduced in thickness and size" (specification: pg 6, lines 15-19). Therefore, *Lee's* device is clearly different from Applicants' and cannot exhibit the beneficial effects of the present invention, namely: (i) suppression of glass component bleed out, (ii) reduction in the amount of grinding or polishing required, and (iii) elimination of wire bonding on the front surface.

The Office has asserted that *Shinosawa* satisfies the deficiencies of *Lee*; however Applicants disagree. *Shinosawa* may teach an aluminum nitride substrate with a surface roughness of 0.5 μm Ra or less due to machining (Abstract), but *Shinosawa* is silent with respect to the aluminum nitride substrate being co-fired. Therefore, *Shinosawa* does not teach or suggest Applicants' co-fired aluminum nitride substrate where the substrate body, via-holes for electric conduction, and circuit layers are simultaneously formed by one sintering operation, resulting in: (i) suppression of glass component bleed out, (ii) reduction in the amount of grinding or polishing required to obtain a surface roughness of 0.3 μm Ra or less, and (iii) elimination of wire bonding on the front surface. Thus, the combination of *Shinosawa* with *Lee* still does not remedy *Lee's* deficiencies because neither reference teaches Applicants' co-fired aluminum nitride substrate. Accordingly, *Lee* in view of *Shinosawa* does not render obvious Applicants' claims.

Claims 3 and 6-7 are rejected under 35 U.S.C. §103(a) as being unpatentable over *Lee* in view of *Shinosawa*, and further in view of *Nakabayashi* and *Arai* respectively. However, Applicants submit that neither *Nakabayashi* nor *Arai* teach Applicants' co-fired aluminum nitride substrate where the substrate body, via-holes for electric conduction, and circuit layers are simultaneously formed by one sintering operation. Therefore, since neither *Lee* nor *Shinosawa* teach or suggest Applicants' co-fired aluminum nitride substrate, as discussed

above, then no possible combination of *Lee*, *Shinosawa*, *Nakabayashi* or *Arai* could teach Applicants' substrate. Accordingly, any combination of the four references does not render obvious Applicants' claims.

Applicants submit that all now-pending claims are in condition for allowance. Applicants respectfully request the withdrawal of the rejections and passage of this case to issue.

Respectfully submitted,

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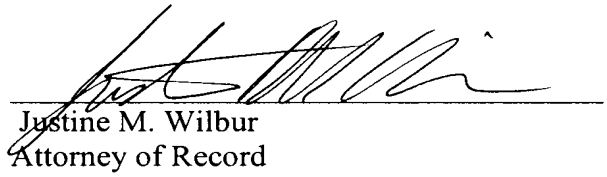

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